



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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RCRA RECORDS CENTER
FACILITY MacDermid
I.D. NO. CTD001164599
FILE LOC. R-13
OTHER RDMS# 100191

April 29, 2003

Mr. Troy Charlton
MacDermid Incorporated
245 Freight Street
Waterbury, CT 06702



RDMS DocID 00100191

Re: Technical Review of Documentation of Environmental Indicator Determinations (CA725 and CA750) for MacDermid Incorporated, Waterbury, CT (CTD001164599)

Dear Mr. Charlton:

Please find enclosed EPA New England- Region 1 review of the Documentation of Environmental Indicator (EI) Determinations (CA725 and CA750), dated November 2002, for the MacDermid Incorporated Facility located on Huntingdon Ave. in Waterbury CT.

EPA's technical review is based on the information provided in the Documentation of Environmental Indicator (EI) Determination Forms - CA725 Current Human Exposures Under Control and CA750 Migration of Contaminated Groundwater Under Control. Background and supporting information used during the review was provided in the *Conceptual Site Model (CSM) and Screening Levels, MacDermid Incorporated, May 2002* and *RCRA Corrective Action Stabilization Report, May 2001*.

The EI determinations will remain "IN" for both EIs (i.e., additional information is needed). The main issues are summarized below and detailed comments are contained in Attachment 1.

With respect to the HEC EI, it is unclear whether VOCs in soil and/or groundwater at the MacDermid Site are adversely affecting indoor air quality in on-site and off-site industrial buildings and off-site residential dwellings, as the facility has not collected indoor air sampling data or soil gas data nor has vapor intrusion modeling been conducted. It is our current understanding that the buildings are currently unoccupied. As long as there are no human receptors, this pathway may not need further evaluation for achievement of the HEC EI.

Also with respect to the HEC EI, surface water and sediment has been inconsistently evaluated (CSM vs EI checklists) and inadequately characterized to determine that unacceptable human exposures are controlled. This may be most easily addressed for the HEC EI by evaluating and documenting the actual use and inaccessibility of these water bodies.

With respect to the CA750 determination, the data presented do not adequately support the

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"YES" determination assigned by the facility. Additional data is needed to demonstrate an adequate understanding of groundwater contamination at the site, including a discussion of concentration trends, vertical and horizontal extent of contamination, groundwater flow direction in the western part of the site, evaluation/reevaluation of source areas (including sources of DNAPL and LNAPL), and groundwater/surface water interaction.

We would like to discuss these issues further at a meeting and site visit as soon as possible. Please feel free to contact me at (617) 918-1368 if you have any questions.

Sincerely,

A handwritten signature in cursive script, appearing to read "Carolyn J. Casey".

Carolyn J. Casey
RCRA Facility Manager

Enclosures

cc: P. Franson, CTDEP

ATTACHMENT 1

REVIEW OF DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATIONS (CA725 AND CA750) MACDERMID, INCORPORATED WATERBURY, CONNECTICUT DATED NOVEMBER 2002

EI RCRIS Code CA-725, Current Human Exposures Under Control

Question 2

1. MacDermid has indicated that indoor air is not reasonably expected to be contaminated above appropriately protective risk-based levels. As stated on Page 5, "Indoor air samples have not been collected at the Site." In spite of this, MacDermid has not assessed the potential for indoor air exposure of off-site residents and on-site workers from the volatilization of compounds in groundwater beneath the Site.

In the evaluation of the indoor air vapor intrusion pathway, MacDermid concludes that since depth to groundwater measurements indicate groundwater is approximately 26 to 34 feet below grade, volatilization from groundwater is an unlikely exposure pathway for indoor workers as well as off-site residents. MacDermid cites Section 22a-133k-3 (c)(1) of the Connecticut Remediation Standard Regulations (RSR) which requires that all groundwater polluted with a volatile organic substance within 15 feet of the ground surface or a building, be remediated such that the concentration of each such substance is equal to or less than the applicable volatilization criterion for groundwater.

Groundwater beneath buildings or off-site structures is at a depth of greater than 15 feet (i.e., groundwater beneath the Site is approximately 30 feet below grade), and consistent with the State of Connecticut RSRs, volatilization of constituents is not considered a complete pathway to residential receptors or indoor workers. Therefore, MacDermid determines the pathway for indoor air incomplete.

However, in EPA's final comments (sent to MacDermid on July 22, 2002) addressing the *Conceptual Site Model (CSM) and Screening Levels* (May 2002), EPA stated (in Specific Comment 3) that "Even if groundwater is 30 feet below grade, volatilization from contaminated soils may create an indoor air risk."

Furthermore, current EPA subsurface vapor intrusion guidance, *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway From Groundwater and Soils*, (November 2002), which replaces the December 2001 draft RCRA Environmental Indicator Supplemental Guidance for Evaluating the Vapor Intrusion Into Indoor Air

Pathway, indicates that the facility should consider the possibility of exposure by this pathway if the facility has or suspects the presence, in soil or groundwater, of volatile chemicals (Henry's Law Constant $> 10^{-5}$ atm m³/mol), located at depths/distances of 100 feet below ground surface (bgs) or less (horizontal or vertical) (Section IV, Page 8). Page 17 of this guidance discusses the development of the suggested distance with the following text:

"The recommended distance is designed to allow for the assessment to focus on buildings most likely to have a complete vapor intrusion pathway. Vapor concentrations generally decrease with increasing distance from a subsurface vapor source, and eventually at some distance the concentrations become negligible. The distance at which concentrations are negligible is a function of the mobility, toxicity and persistence of the chemical, as well as the geometry of the source, subsurface materials, and characteristics of the buildings of concern. Available information suggests that 100 feet laterally and vertically is a reasonable criterion when considering vapor migration fundamentals, typical sampling density, and uncertainty in defining the actual contaminant spatial distribution."

Although it appears that MacDermid's CA725 assessment is generally consistent with the RSRs, considering the current draft U.S. EPA guidance suggests that the presence of volatiles in groundwater or soil at approximately 30 bgs could potentially impact indoor air quality, resulting in a complete exposure pathway for on-site indoor workers and off-site residents.

Revise the EI Determination to provide a rationale for the exclusion of the potential indoor air inhalation risk as a result of the volatilization of contaminants in site soil to indoor air. Alternatively, revise the table for Question 2, to reflect that currently it is *unknown whether indoor air is contaminated above appropriate risk levels due to volatilization from contaminated subsurface soils.*

2. MacDermid has indicated that surface water and sediments are not reasonably expected to be contaminated above risk-based levels. While it is recognized that no surface water bodies exist on-site, surface water and sediments in the Naugatuck River and/or Steele Brook, located approximately 1,000 feet southeast and southwest of the Site, respectively, could potentially be contaminated above risk-based levels as a result of impacted groundwater discharge to these water bodies. In addition, as stated on Page 6, "Sediment quality may also have been impacted by a release of copper etchant in 1994 to MacDermid storm water catch basins that discharge to Steele Brook." A 1994 release assessment included collection and analysis (metals) of 18 sediment samples including two that were collected from upstream of the discharge area. Results indicated that concentrations of metals were generally highest at the point of discharge into Steele Brook with declining concentrations further downstream. No information suggests remediation and/or post-remediation sampling was conducted.

The impacts of site operations and contaminated groundwater migration on surface water and sediments must be appropriately addressed and evaluated in the EI Determination. The impact and resolution of the 1994 release must be described and the current impact of contaminated groundwater on surface water and sediment in the Naugatuck River and Steele Brook must be discussed. Revise the table for Question 2 accordingly regarding whether surface water and sediment are impacted at greater than risk-based levels as a result of current and historic discharges from the facility.

3. Page 4 of the EI Determination outlines receptors, exposure pathways and media to be considered in the evaluation and determination of whether current human exposures are under control. Trespassers are included in MacDermid's assessment of potential on-site receptors, as trespassers could potentially be exposed to contaminated media through "dermal contact with surficial soils and known contaminated soils (metal hydroxide sludge) on the MacDermid North parcel on the northern side of Huntingdon Avenue." However, according to Page 3, paragraph four, between 1978 and 1979, approximately 1,000-cubic yards of metal hydroxide sludge was removed from on-site waste lagoons and disposed of in an excavated area on the southeastern portion of the MacDermid North parcel located on the northern side of Huntingdon Avenue. In 1986, the material was covered with approximately nine inches of processed aggregate and three inches of asphalt, which appears in drawings accompanying the EI Determination as the "Sludge Disposal Cap Area." Therefore, it seems unlikely that a trespasser could come into contact with the metal hydroxide sludge beneath the capped area. Alternately, unless the extent of contamination in this area was determined, the trespasser exposure to surface soils pathway should be evaluated (refer to comment 5 and 6, below). Provide information to document that the extent of the cap completely covers the sludge and contaminated soils that were placed on the North parcel. Revise the EI Determination to clarify this issue.
4. Drawing 2 depicts Site features, groundwater sampling locations, and an interpretation of groundwater flow direction beneath the Site. Page 5, first paragraph, presents the statement that, "Based on an evaluation of depth to groundwater and topographic relief change between the Site and the Naugatuck River, it is likely that groundwater beneath the Site discharges to the Naugatuck River." MacDermid continues, (Page 5, fourth paragraph) "From a review of groundwater analytical data collected in July and September 2002, combined with the fact that groundwater flow beneath the Site is southerly toward the Naugatuck River, it is concluded that contaminated groundwater at the Site does not have the potential to impact abutting residential properties to the southwest." Lack of groundwater contours on the west side of the site (Gear Street side), Drawing 2, does not provide support for this conclusion. Also, according to other statements made throughout the text, groundwater flowing beneath the Site discharges to both the Naugatuck River and Steele Brook. The potential for groundwater flow to the southwest toward the residential properties and Steele Brook should be evaluated with the

installation of at least one additional groundwater monitoring well. Additional sampling for volatile organic compounds in groundwater to evaluate the potential for off-site indoor air impacts, and quarterly groundwater elevation measurements should be completed. Revise the CA725 to eliminate any discrepancies between the text, figures, and groundwater flow interpretations at the facility. Further, in consideration of a component of groundwater potentially discharging to Steele Brook, the EI Determination should be revised to consider contaminated groundwater impacts to adjacent residential properties.

5. Page 6 of the EI Determination states that soil sampling was conducted in areas where an exposure pathway exists (i.e., exposed soil, grass, and landscaped areas)—those areas likely to be encountered by Excavating Laborers, Groundskeepers, Environmental Samplers and Trespassers. Facility drawings accompanying the EI Determination illustrate potential trespassing and groundskeeping exposure areas, however, no rationale has been provided in the text of the document to clarify why certain areas of exposure were evaluated in conjunction with specific receptors. For example, according to facility drawings, only two on-site areas have been depicted as potential trespasser exposure areas – the sludge disposal cap area located on the MacDermid North parcel on the northern side of Huntingdon Avenue and several discontinuous patches of property on the South parcel adjacent to East Aurora Street. It is not clear why the sludge disposal cap area located on the North parcel was the only area expected to be encountered by trespassers verses the entire North parcel. Access to this area is not limited by controls such as fencing, gates, security personnel, etc. Provide documentation showing the exact extent of the property owned by MacDermid Inc. on the North parcel. Discuss the areas where drums were removed and provide data showing that there is no residual contamination from these drums. Revise the EI Determination to provide the rationale as to why exposure to specific receptors is limited to certain on-site areas of interest (i.e, what controls have been implemented to mitigate potential exposures at the facility for specific receptors), or alternatively, provide a citation to the appropriate reference where this information may be located in other facility documents.
6. Page 6 of the text presents the statement that the surface soil sample data set “...is adequate to assess the quality of surface soil in those areas likely to be encountered by Excavating Laborers, Groundskeepers, Environmental Samplers and Trespassers.” However, according to Drawing 3, which depicts the locations of historic and recent soil sampling locations, no recent surface soil samples have been collected and analyzed from the NORTH parcel, where a trespassing exposure scenario is likely to occur. Recent soil data includes four surface soil samples (SB-001 through SB-004) collected from the SOUTH parcel only. Revise the EI Determination to provide justification regarding the adequacy of applying soil sampling data from surface soils collected from the SOUTH parcel to assess the impact to potential surface soil exposure scenarios in the NORTH parcel.

7. Page 6 of the text presents the statement that, “The only relevant potential exposures to the Naugatuck River and the Steele Brook from the Site are as a result of groundwater discharge to these water bodies as it is unlikely these water bodies would be used for recreational purposes.” However, MacDermid has not provided any justification or compelling evidence to support this statement (i.e., a surface water classification which would render the Naugatuck River and Steele Brook unfit for recreational purposes). According to Section 2 (Page 2-1) of MacDermid’s *Conceptual Site Model (CSM) and Screening Levels* (May 2002), Steele Brook has been assigned a classification of “B” and the Naugatuck River a classification of “C/B” by the Connecticut Department of Environmental Protection (DEP). According to the Connecticut Water Quality Standards, a class “B” water body includes such designated uses as recreational use, fish and wildlife habitats, agricultural and industrial supply and navigation. A “C/B” classification indicates that the surface water body has been impacted by point or nonpoint sources of pollution and currently does not meet criteria to support one or more designated uses of a class “B” water body, however, the water quality goal is achievement of Class B criteria and attainment of Class B designated uses. Section 3.2.3 of the CSM states that, “...recreators including sport fisherman and boaters could potentially be exposed to surface water and sediment in these rivers,” and recreator exposure to Site contaminants via ingestion of fish is considered complete since chemicals that typically accumulate in fish tissue generally could be transported via groundwater. Further, although the EI Determination mentions the low probability that the Naugatuck River and Steele Brook will be used for recreational purposes in Question 2, Page 10 provides supporting rationale for Question 3 which states that “Direct contact with Site groundwater is possible to Off-site Recreators as it discharges into the River.” Revise the EI Determination to eliminate any inconsistencies between the rationale presented to support the current human exposures under control determination, or alternatively revise the text to provide justification as to why recreational activity in the Naugatuck River and Steele Brook is reliably precluded.

Question 3

8. It is unclear why food was excluded from the exposure pathway evaluation, as contaminated groundwater emanating from the Site could potentially impact surface water, sediments and consequently fish in nearby surface water bodies. According to MacDermid’s *Conceptual Site Model (CSM) and Screening Levels* (May 2002), recreator exposure to Site contaminants via ingestion of fish should be considered since chemicals that typically bioaccumulate in fish tissue generally could be transported via groundwater. If the exposure pathway is not complete for any contaminated media-receptor combination, indicate such in the summary table and provide the rationale and references to support such a determination in the text of the document. Revise the EI Determination accordingly.
9. Surface soil has been excluded from the list of potentially contaminated media in the

Exposure Pathway Evaluation Table. Although in Question 2 MacDermid indicated that surface soil was not known or reasonably suspected to be contaminated above appropriate risk-based levels, surface soil should still be retained in the Exposure Pathway Evaluation Table, as the EI Form indicates. According to the instructions for completing the table under Question 3, specific media which are not found to be “contaminated” (per Question 2), should be struck-through on the table. Revise the Summary Exposure Pathway Evaluation Table as appropriate.

10. According to the Summary Exposure Pathway Evaluation Table, MacDermid has determined that a complete pathway exists for recreational receptors exposure to surface water and sediment. However, in Question 2, only groundwater, subsurface soil, and ambient air were determined to be contaminated above appropriately protective risk-based levels. Therefore, as the responses and rationale presented in Question 2 determine the media which are considered during the exposure pathway analysis, many of MacDermid’s responses as presented in the Summary Evaluation Table for Question 3 appear to be inconsistent with previous determinations. For example, residential exposure to groundwater, subsurface soil, and air (i.e., contaminated media as identified per Question 2) should be evaluated in Question 3. According to the EI Form template, residential exposure to subsurface soil may not be probable in most situations (see Note under Question 3), and therefore may not require a specific response in the table. However, MacDermid provides no response for the groundwater and ambient air residential exposure scenarios, which are probable exposure pathway combinations. Revise the EI Determination to eliminate any inconsistencies between Questions 2 and 3.
11. Page 4 of the EI Determination outlines potential receptors and exposure scenarios associated with on-site and off-site activities. The bulleted list clearly distinguishes between on-site workers (e.g., excavating laborers, groundskeepers, indoor workers, environmental samplers) and off-site workers (e.g., utility repair workers). However the Summary Exposure Pathway Evaluation Table as outlined in Question 3, identifies potential human receptors in the industrial setting as “Workers” or “Construction”. Therefore, it is unclear as to which category previously identified on-site and off-site workers are considered, as MacDermid has not provided a distinction between workers and construction workers in the evaluation of exposure pathway completeness. Revise the EI Determination to clarify this issue. Preferably, the Exposure Pathway Evaluation Table outlined in Question 3 should be revised to account for the potential receptors identified in the bulleted list in Question 2 (Page 4).
12. Page 9 of the EI Determination discusses workers’ exposure to contaminated ambient air (e.g., trench air) and groundwater. The text states that excavating laborers’ exposures to contaminants in groundwater, subsurface soil, and trench air will be controlled through the implementation of an institutional control, the Project Activity Analysis (PAA) process. However, as presented in the Summary Exposure Pathway Evaluation Table, a complete pathway exists for workers who are exposed to groundwater, subsurface soil,

and ambient air and construction workers who are exposed to subsurface soil and ambient air. Therefore, if the PAA process controls worker exposure to contaminants in subsurface soil, ambient air, and groundwater, it is unclear why a complete exposure pathway determination was made for industrial receptors' exposure to groundwater, subsurface soil, and ambient air. Revise the EI Determination to eliminate this apparent inconsistency between the rationale and determination summary.

13. Page 12 (Question 4) of the EI Determination states that MacDermid compared on-site groundwater data to the Connecticut surface water protection criteria (SWPC) to address potential impacts to surface water based on discharge at the groundwater-surface water interface (GSI). In 2002, groundwater from four monitoring wells contained constituents that exceeded the SWPC. Therefore, MacDermid chose to calculate a site-specific dilution attenuation factor (DAF) in order to determine the potential impact of site groundwater discharge to the surface water and sediment of the Naugatuck River and Steele Brook, in accordance with the methodology provided in Section 22a-133k-3 (b)(3)(A) of the RSR. However, unless the flow dynamics within the aquifer (e.g., hydraulic conductivity, hydraulic gradient, cross-sectional discharge area) discharging to both the Naugatuck River and Steele Brook is exactly the same and unless the flow dynamics within the bodies of water themselves are the same, then the calculated DAF, as presented, should not be applied to both water bodies. Revise the text to provide justification how one site-specific DAF can be applied to two separate water bodies which appear to be drastically different (i.e., one has significantly less flow) or, alternatively, calculate two separate and unique DAFs to address the potential impact of groundwater discharge to both the Naugatuck River and Steele Brook.
14. In accordance with the RSR, MacDermid calculated a site-specific DAF to evaluate the potential impact of contaminated groundwater emanating from the MacDermid facility to surface water and sediment in nearby surface water bodies. The calculated DAF $[(0.25 * 7Q_{10})/Q_{plume}]$, a value of 29.11, was multiplicatively applied to the SWPC (Appendix D to Sections 22a-133k-1 through 22a-133k-3 of the RSR), in effect computing an alternative surface water protection criteria. Following this approach, constituent concentrations detected in groundwater discharging from the Site into nearby surface water bodies was found to be well below the calculated alternative surface water protection criteria. MacDermid concluded that "Based upon these results, surface water and sediment in the Naugatuck River do not represent a significant exposure." However, it appears that MacDermid may have incorrectly applied the DAF to the SWPC in the RSR. The SWPC, established for the purposes of screening groundwater for the protection of surface water, already have an attenuation factor applied to account for the dilution of contaminants in groundwater prior to reaching the receiving surface water body. According to Section 22a-133k-3 (b)(3)(A) of the RSR, "An alternative surface-water protection criterion may be calculated for a substance listed in Appendix D of the most recent State of Connecticut Water Quality Standards by multiplying the lower of the human health or aquatic life criterion for such substance in said Appendix D..." by the

DAF. Therefore, if this calculation is advanced and the MacDermid DAF, is correctly applied to the Connecticut Water Quality Standards numerical water quality criteria (as found in Appendix D of the Connecticut Water Quality Standards), the alternative surface water protection criteria for arsenic, for example, is established as a value of 1.83 $\mu\text{g/L}$ (verses 116.44 $\mu\text{g/L}$ as calculated by MacDermid). In addition, when evaluating carcinogens via this route of exposure an adjustment must be made to the 7Q10 term, such that exposures over a 70 year human life span are considered. This adjustment considers the 70 -year mean harmonic flow of the water body and may be calculated by multiplying the 7Q10 term by a factor of three. Also, when choosing the lower of the human health or ecological criterion from the State of Connecticut Water Quality Standards (Appendix D), a facility is not required to consider the “water and organisms” criteria under the human health setting for evaluation of a Class B (or lower) surface water body. In this instance, the sole human health criteria which must be considered is the “organisms only” criteria. Revise the EI Determination to appropriately apply the site-specific DAF to calculate alternative surface water protection criteria, or alternatively, apply the default or generic CTDEP SWPC in Appendix D of the RSR as a groundwater screening tool in determining whether potential impacts to surface water and sediment will result in significant exposures.

EI RCRIS Code CA-750, Migration of Contaminated Groundwater Under Control

Question 2

1. The third full paragraph on Page 4 discusses the results of the 2002 groundwater sampling and mentions that the concentrations of contaminants detected in 2002 “were similar or less than previously detected in wells during the 1995 and 2001 sampling events.” This statement is not supported by the contaminant concentrations presented in Drawing 1. For example, concentrations of tetrachloroethylene (PCE) in monitoring well MW-110 were 12, non detect, and 95 ug/L in 1995, 2001, and 2002, respectively. Concentrations of 1,2-dichloroethane (12DCA) in monitoring well MW-111 were 4, 17, and 84, respectively. The discussion of trends in the concentrations of contaminants detected in groundwater at the site is an appropriate subject for discussion in the EI Determination. Typically, concentration trends are discussed in response to Question 3 of the EI Form yet some mention of trends may be appropriate in response to Question 2. Nevertheless, any discussion of trends mentioned in the text of the EI Determination should be firmly supported by the analytical results that are being discussed. Please revise the EI Determination to provide accurate information on any observed trends in the concentrations of contaminants in the groundwater at the site.
2. Drawing 1, referenced in the response to EI Question 2, presents the tables with groundwater analytical data, boring depth, and depth to water measurements. The boring depths and depth to water measurements are only presented for a portion of the

monitoring wells. The depth to water and boring depth information is useful for understanding the hydrogeologic conditions in the vicinity of each well and should be provided consistently for each well. A separate table summarizing all depth to water measurements with dates the measurements were taken would be an appropriate table to include. Information on screened interval should also be provided for each well and depth to bedrock should be provided where available.

3. Drawing 2, referenced in the response to EI Question 2, does not appear to follow generally accepted procedures to illustrate potentiometric contours at the site. The contour interval varies from 0.25 feet, in the southern and central portion of the site, to 1 foot, in the northern portion of the site. The drawing should be revised to either present a consistent contour interval across the entire site or to use distinct line patterns for the whole-number contours and the fractional contours.

Further, it is not clear that the contours presented on Drawing 2 adequately characterize groundwater flow at the facility. Ideally, it would be useful to see contours presented under various hydrogeologic conditions ranging from wet (high water table) to dry (low water table) conditions. If data is available from other potentiometric measurement rounds, additional drawing should be provided in the EI Determination or referenced, as appropriate. Additionally, the contours presented in the vicinity of monitoring well MW-109 (963.25 feet above mean sea level [amsl]) may not necessarily support the south-southeast groundwater flow direction suggested by the west-end of the 963 foot contour (i.e., in the vicinity of the western boundary of the site). Although there are no other available data points in the northwest portion of the site it seems possible that the 964, 963, and 962.75 foot contours could potentially be drawn in a way to suggest a component of groundwater flow off-site to the west of the facility toward the residential neighborhood on Huntingdon Place. Please revise the EI Determination and/or Drawing 2 to provide the best data available on groundwater flow directions at the site. If previous potentiometric surface mapping has been conducted, please present or reference the mapping and use the historic mapping as a guide, as appropriate, to complement the 2002 contouring.

Finally, the text of the EI Determination (Page 4, 2nd full paragraph) states that “only a sheen” of product was detected in monitoring well MW-108 on September 5, 2002. Note 5 at the top of Drawing 2 states that MW-108 was “not used in developing the groundwater contours due to the presence of product in the well....” Typically, a sheen may be sufficiently thin that it would not interfere with groundwater measurements. Please revise the EI Determination or Drawing 2 to accurately describe whether product or a sheen was present in MW-108 during the September 5, 2002 measurement round. Due to the importance of MW-108 to understanding groundwater flow directions in the northwest portions of the property, and in the vicinity of the western boundary of the site, it is important that groundwater elevation data from well MW-108 be presented, if it is determined to be reflective of potentiometric conditions at the site.

Provide a summary of the procedures used to extract the product monitoring well MW-108 and summarize subsequent follow-up measurements since September 5, 2002 (include dates the measurements were taken) to evaluate the whether the product thickness remains a sheen or is accumulating again.

Please submit copies of the boring logs, field notes, laboratory data sheets, and chain of custody forms for the well installations and groundwater monitoring conducted in August 2002.

Question 3

4. EI determination Question 3 asks whether the migration of contaminated groundwater has stabilized such that contaminated groundwater is expected to remain within the “existing area of contaminated groundwater” as defined by the monitoring locations designated at the time of the determination. A portion of MacDermid’s response, Page 6, 3rd Paragraph, states that “downgradient monitoring wells MW-111, MW-113, MW-114, and MW-115 generally represent the quality of groundwater as it discharges from the Site....” Additionally, as explained later in the response to Question 3, many of the contaminant concentrations in the downgradient wells at the MacDermid facility exceeded the SWPC, the Residential Volatilization Criteria (RVC), and/or the Industrial/Commercial Volatilization Criteria (IVC) (i.e., wells MW-111 and MW-115). Further, the response to Question 3 states that floating product was recently observed in an onsite monitoring well (MW-108). These factors do not seem to support the stabilization of contaminated groundwater migration at the site. If appropriate, some of these discussions of the presence of groundwater contamination may be moved to the response to EI Question 2. The response to EI Question 3 does not appear to demonstrate an adequate understanding of the vertical extent of the plume which is an inseparable aspect of delineating the *contaminated groundwater and any discussion of the ‘existing area of contaminated groundwater.’* Further, the discussion of observed trends in the concentrations of contaminants in the groundwater (Page 6, 4th paragraph) appear to support that the ‘existing area of contaminated groundwater’ may be expanding, rather than stable. In order to demonstrate that the migration of contaminated groundwater has stabilized at the facility the following apparent deficiencies should be addressed:
 - The data presented in the EI Determination does not define the vertical distribution of contamination in the aquifer. The EI Determination should be revised to describe the vertical distribution of contamination in the saturated unconsolidated deposits in the vicinity of the site and to describe any potential contamination that may have impacted any bedrock aquifers at the site. The adequacy of the monitoring well network for evaluating the vertical distribution of contaminants in the upper aquifer and the bedrock should be discussed. Any historic releases of dense non aqueous phase liquids (DNAPL) should be described and any other potential for DNAPL to be present in the subsurface in

the vicinity of the site should be addressed.

- Concentration versus time graphs for selected chemicals in selected downgradient wells may be appropriate for displaying trends in the concentrations of contaminants in groundwater at the facility. Alternatively, shading appropriate rows of the tables presented in Drawing 1 may also be used to provide additional information on trends. Currently, the response to Question 3 describes concentration trends in several wells that are observed to increase over time. The presented argument that “Because there is no known continuing sources it is expected that dissolved constituents in the groundwater will remain within an area defined to the north, south and west...” does not seem to be supported by the observed increasing trends that continue through 2002. Therefore this argument does not appear to be appropriate to support the “YE” determination presented in the EI, especially considering there is no discussion of any source removal activities that have taken place in the past several years that would suggest concentrations will begin to decrease. Any increases in contaminant concentrations that may be attributed to natural attenuation processes should be discussed in the EI Determination.
- Floating product recently observed in an onsite monitoring well has apparently been reduced in thickness from 0.5 feet to a sheen. The source of this product has not been adequately discussed and the nature and extent of dissolved constituents related to this product has not been defined.

The issues described above must be addressed prior to making a determination on whether the migration of contaminated groundwater at the MacDermid facility has stabilized.

Question 4

5. Many of the CA750 EI Determination decisions are based on the assumption that groundwater from the MacDermid facility discharges into the Naugatuck River. A portion of the response to EI Question 4 (Page 8, bulleted list) states that groundwater from the facility flows to the south in the direction of the Naugatuck River, the water surface elevation of the Naugatuck River is approximately 10 feet lower than the groundwater surface at the southeastern property line, and there are no other surface water bodies in the vicinity of the facility. Although it is plausible that the shallow groundwater from the MacDermid facility discharges into the Naugatuck River, it is not certain that all contaminated groundwater discharges into the Naugatuck River. First, the Steele Brook is another surface water body in the vicinity of the site. Any language presented in the EI Determination that suggests that “there are no other surface water bodies in the vicinity of the facility” should be revised to account for the presence of Steele Brook. Further, the hydrogeologic influence of Steele Brook on groundwater flow at the site should be characterized and, similar to the approach used in the CA725 EI Determination, the Steele Brook should be considered in discussion of groundwater-

surface water interactions at the site.

Second, additional information is required in order to sufficiently demonstrate that the contaminated groundwater from the MacDermid facility discharges into the Naugatuck River (or Steele Brook) and does not flow under the river(s). For example, the vertical contaminant distribution in the aquifer should be shown. The EI Determination should provide detailed information on the saturated thickness of the aquifer, screened interval, and depth to bedrock in the vicinity of the facility and in the area between the facility and the Naugatuck River. Also, the EI Determination should characterize the portions of the surface water bodies that are expected to receive contaminated groundwater from the site to determine if they are gaining streams. The interaction between groundwater and surface water may be characterized by measuring the amount of groundwater discharge (flux) into the river or brook. The calculation of flux considers the horizontal and vertical components of groundwater movement, cross-sectional area of aquifer interacting with the water body, and other aquifer parameters. This information could be obtained by field measurements in the vicinity of the water bodies, such as evaluating water level data collected from a network of piezometer nests, or by considering regional studies, perhaps such as studies conducted by the U.S. Geological Society (USGS). Without quantitative data on vertical components of groundwater flow, the magnitude of flux is difficult to determine. Currently there is no information presented from monitoring wells located between the MacDermid facility and the Naugatuck River or Steele Brook. The groundwater flow at depth within the shallow aquifer may possibly exist within a regional groundwater flow system that does not discharge to the Naugatuck River or Steele Brook. Groundwater that is not discharging to the Naugatuck River, for example, could be migrating under the river or in another direction, potentially impacting drinking water resources. It was unclear by the information presented in the EI Determination if there are drinking water wells located on the south side of the Naugatuck River, opposite of the MacDermid facility.

The EI Determination should be revised to include the additional information on the vertical contaminant distribution in the aquifer, the interaction between the aquifer and the Naugatuck River and Steele Brook, and whether or not drinking water wells are located on the south side of the Naugatuck River.

Question 6

6. Specific Comments on MacDermid responses to CA725 Question 3, provided above, identify apparent errors related to the application of the DAFs during the MacDermid EI process. Essentially, flow into Steele Brook should be assessed and assigned a unique and appropriate DAF. Also, the DAFs should be correctly calculated in accordance with the RSRs. These comments on the DAF process described in the CA725 appear to apply to the response to CA750 Question 6, which also discusses the application of DAFs at the site. Please review the application of DAFs in the CA750 in accordance with the CA725

comments on the DAF process and revise the calculations and related conclusions appropriately.

Question 7

7. In consideration of some of the issues identified elsewhere in these comments, the response to EI Question 7 may require revision to include a description of future groundwater monitoring. The groundwater monitoring should adequately consider the vertical and horizontal extent of contamination in the aquifer in the vicinity of the site. It appears that the future groundwater monitoring may be required until sufficient data has been collected to demonstrate the stability of the groundwater plume at the site.